and by far the most frequently not at all; while in general, as is the case at Thun, *elatior* grows by thousands in places within many leagues of which *vulgaris* is absolutely unknown. *P. vulgaris* contents itself with an elevation but little above the level of the sea, although in the neighbourhood of the Lake of Geneva it is in perfect condition at from 1200 to 1500 feet; but at Thun, with an elevation of 1900 feet, it languishes, whether planted in a thicket, on a bank, or in a garden; while *elatior*, being more aspiring, prefers an elevation of from 1500 to 2000 feet, and although climbing willingly beyond the latter, descends reluctantly below the former level."

Professor Balfour (of Glasgow) made observations on the distinctions subsisting among the genera of Ferns, *Anemia, Mohria, Coptophyllum, Trochopteris,* and *Schizæa,* some of which had been recently established by Mr. Gardner. These distinctions, which are founded partly on the mode in which the fertile and barren fronds are developed, were illustrated with a series of specimens belonging to the above genera, most of which had been collected by Mr. Gardner in the province of Goyaz, Brazil. The professor next alluded to the various theories which have been advanced to account for the origin of woody fibre, and more especially to that of Du Petit-Thouars. He showed, by sections of palms, that the interlacing of the fibres in endogenous plants was quite in conformity with Du Petit-Thouars' theory, and that the appearance of the woody matter in tree-ferns, and in the natural orders *Piperaceæ, Aristolochiaceæ,* and the formation of roots externally in some tree-ferns, in screw-pines, *Vellosias,* &c., all supported the theory of wood being formed by the development of fibres from buds acting as fixed embryos. Dr. Balfour also endeavoured to show that the formation of what have been called by Dutrochet *embryo buds,* may in many cases be accounted for by the development of leaves on them at one period of their growth; and that on examining some others which he exhibited, the woody matter might be traced communicating with the alburnum at one point by rupture of the bark, and insinuating itself between the layers of bark.

MISCELLANEOUS.

Notices relative to Palæontology; by the Rev. Dr. BUCKLAND. *From his Anniversary Address to the Geological Society of London.*

MAMMALIA.—OSSIFEROUS CAVERNS.

Mr. R. A. C. Austen, in a notice on the bone caves of Devonshire, at Torquay and Yealmton, disputes the opinion that the bones in these caves, many of which are evidently gnawed, have been dragged in by the agency of hyænas, founding his objection on the assumption that modern hyænas "do not inhabit caves," and "never drag away their prey, but devour it greedily on the spot." Mr. Austen must have overlooked the evidence of Busbequius, quoted in my 'Reliquiæ Diluvianæ,' p. 22, 1st edit., "Extrahitque cadavera, portatque ad speluncam suam," and cannot have heard of the gnawed bones in the Oxford Museum, extracted by

Col. Sykes from the depth of eighteen feet in a cave, at the mouth of which he shot both the male and female hyæna that inhabited it, and descending its interior ran his head against a putrid portion of an ass which stuck across and obstructed the passage.

Mr. Austen is disposed to substitute the agency of lions for that of hyænas in the work of collecting the bones that are so abundant in the caves of Devonshire, and correctly states that the bones of lions, or a large Felis, larger than a lion, have been found in nearly all the ossiferous caverns. Now in all the caves of which I have any experience, the remains of lions are very rare in comparison with the number of hyænas' bones in the same cavern; and without denying to these few lions their lion's share in the work of killing their prey and eating the flesh, I must claim the bones as the perquisite of their more ossifragous brethren, and demand justice to the hyænas, as the chief, I do not say the exclusive, agents in dragging them to their dens.

The proportion of teeth in the cave of Kirkdale indicated one lion to nearly 100 hyænas.

REPTILES.

Professor Owen, in a recent paper on the teeth of the Labyrinthodon (Mastodonsaurus of Jaeger), a genus common to the keuper of Germany and to the lower sandstone of Warwick and Leamington, has added another example to the many before produced by him, of the immense importance of microscopic odontology in geological investigations.

Two years have scarcely elapsed, since, by the application of this infallible test, he at once transferred the supposed reptile Basilosaurus of Virginia to a genus allied to the Dugongs in the class of Mammals; and as if in recompense for this abduction from the family of Reptiles, he has now, by the same microscopic test, removed even the supposed approximation in the form of the teeth of the Mastodonsaurus to that of a Mammal, and shown it to be nearer that of Ichthyosaurus than of any other animal. Professor Jaeger had already shown, by the basilar bones of the head, that his Mastodonsaurus was a huge Batrachian reptile allied to the Salamanders, and its teeth, not yet submitted to microscopic examination of their transverse section, presented no apparent peculiarity of internal structure; it was reserved for the microscope of Owen to discover within this tooth a condition of cerebriform convolutions or labyrinthoid gyrations, hitherto unknown in the entire animal kingdom; and on this just ground he substitutes the characteristic name Labyrinthodon for that of Mastodonsaurus, which implied affinities that have no existence.

The fang of the tooth of the Ichthyosaurus offers the only known approximation to the plan of that of the Labyrinthodon, but on a more simple scale, and had been hitherto considered the most complex condition of dental structure in the family of Reptiles; in both these animals the external layer of cement is inflected inwards to a certain distance from the circumference towards the centre in straight and vertical folds at pretty regular intervals, which are occupied by dentine radiating from the interior of the tooth; but in the tooth of Labyrinthodon, this dentine, or ivory, is composed of calcigerous tubes $\frac{1}{7000}$th of a line in diameter, radiating and converging with primary curvatures and secondary undulations in a manner unexampled in the history of dentition. This gigantic Batrachian prototype of the Bull Frog, Mr. Owen has discovered to be the author of the footsteps ascribed to the so-called Chirotherium. Teeth of two smaller species of Labyrinthodon have been found by Dr. Lloyd in the sandstone of Warwick, and although no English teeth of the Stutgard species have yet been submitted to the microscope, Mr. Owen strongly suspects that the cast of a large jaw containing several teeth, from Guy's Cliff, near Warwick, the original of which has been mislaid in the Oxford Museum, is identical with the Labyrinthodon Salamandroides of Stutgard; thus almost demonstrating the evidence required by Mr. Murchison and Mr. Strickland * to show the identity of the Warwick and Guy's Cliff sandstones with the keuper of Germany. Mr. Owen concludes, that if on the one hand geology has derived essential aid from minute anatomy, in no instance has the comparative anatomist been more indebted to geology than for the fossils which have revealed the most singular and complicated modification of dental structure hitherto known, and of which no conception could have been gained from an investigation of the teeth of living animals.

Professor Owen has communicated to us a Report on two new fossil reptiles, recently acquired by Sir P. Egerton from the chalk of Kent: one of them a tortoise, allied to the Chelonians which now live in fresh water, or in estuaries; the other a small Saurian, which has teeth generically distinct from any known Lacertians, and resembling the points of stout packing-needles; to this new lizard in the chalk he has given the name *Raphiosaurus*.

Mr. Mackeson has discovered in the bottom of the lower greensand formation near Hythe a very large tibia and several other bones which he refers to the Iguanodon, spread in the quarry over a length of fifteen feet; in the same quarry were a large Ammonite, a Gervillia, and other marine shells characteristic of the lower greensand. We have in these bones another case similar to that of the nearly entire skeleton of Iguanodon found in the greensand near Maidstone, and transferred with Mr. Mantell's collection to the British Museum; showing the duration of the Iguanodon to have extended beyond the period of the Wealden freshwater formation into that of the greensand. In both these cases the carcases must have been drifted into salt water from some not far distant land, the site of which we cannot conjecture to have been nearer than Devonshire, Normandy, or the Ardennes.

ICHTHYOLITES.

Respecting the bone-bed in the Severn near Aust Passage, and at Axmouth Cliff near Lyme Regis, which has hitherto been referred to the bottom of the lias formation, Sir P. Egerton and M. Agassiz have found ichthyological reasons for considering it to be connected with the Triassic or new red sandstone group; because they find in it the teeth of four species of fishes hitherto discovered only in the muschelkalk or *grès bigarré*, and never in the lias, viz. *Gyrolepis Alberti*, *G. tenuistriatus*, *Saurichthys apicalis*, and *Hybodus plicatilis*. It remains to examine the bones of the larger animals in this stratum to ascertain how far they agree with the Saurians of the Triassic system or of the Lias. The teeth of Ceratodus, figured by Agassiz, and many other teeth in the bone-bed not yet described, are unknown in the lias.

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* Geol. Trans., N.S., vol. v. p. 345.

During the past year great additions have been made to our stores of knowledge, and specimens in fossil Ichthyology, by the presentation to our Museum of a very large and rich collection of fishes from the lower beds of the old red sandstone near Forres, which we owe to the zeal and liberality of Lady Gordon Cumming of Altyre.

Her Ladyship and her eldest daughter have further contributed most accurate and exquisitely finished drawings of many fossil fishes from the same locality, in illustration of Dr. Malcolmson's paper on the old red sandstone. These ladies have also supplied many other drawings to the forthcoming volumes of Professor Agassiz. Further information on the fishes of the old red sandstone has been acquired by the diligent researches and extensive collections made in the same department of Palæontology by many scientific gentlemen in the counties of Caithness, Elgin, Nairn, Aberdeen, Forfar and Fife; following up the researches that were begun in this almost new and most curious subject by Dr. Fleming, Professor Sedgwick, Mr. Murchison, Dr. Traill, Dr. Malcolmson and Mr. H. Miller.

The three great subdivisions of the old red sandstone in these counties, with their characteristic genera of fishes, have, by these extensive researches, been fully corroborated, whilst a vast increase has accrued to the known number of species of fishes which appear to be peculiar to the upper, middle, and lower regions of this great formation.

The visit of Professor Agassiz to Scotland in September last, and the grant to him by the British Association of 100*l.* to aid in collecting materials for the publication of a memoir on the fossil fishes of the old red sandstone, have opportunely afforded a concurrence of circumstances most favourable to the diffusion of a new and brilliant light on our future researches in this very ancient department of Palæontology.

Before he left Scotland, Professor Agassiz had recognised, in various collections he visited in that country, undescribed Ichthyolites sufficient to enable him to establish fifteen genera, and more than forty species, the greater part of them not yet named, in the old red sandstone formation*. We have in these details a palæontological confirmation of the fact that the old red sandstone is a system distinct from any other formations; all its numerous Ichthyolites being different from those of the carboniferous system above it, and also different from the few fishes yet found in the upper region only of the Silurian system next below it.

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* The names of these genera are *Acanthodes, Cephalaspis, Cheiracanthus, Cheirolepis, Coccosteus, Ctenacanthus, Ctenoptychius, Diplacanthus, Diplopterus, Glyptolepis, Holoptychius, Onchus, Osteolepis, Platygnathus, Pterichthys.*

Mr. Murchison, during his extensive tour in Russia, in the late summer, has enlarged our knowledge of the range of these curious fishes and of the old red sandstone over vast regions in the north-east departments of Europe. Thus the ichthyological fauna of the old red sandstone has within a few years been found to be one of the richest and most prolific kind; and its extinct species are much more curious and remarkable than those of any other formation, by their deviation from the conditions of existing genera and species. Their most characteristic feature is an immense development of bony matter and enamel on the surface of the skin, thus approaching to the external dermal skeleton of Crustacea and Insects. One of these fishes, the Pterichthys, is so largely and almost entirely encased with bony plates and scales, that it was at first mistaken for a fossil Water-beetle.

The nearest analogies we find among modern fishes to the great development of bony matter and enamel upon the head and scales of many of these ancient species, is that afforded by the large external bones which form the head and large bony dermal scales upon the body of the modern Sturgeons, which further agree with these fossils in having no internal bony skeleton.

Another analogy occurs in the large external bones of the head of the Flying Fish, and of the common Gurnard. These bones are also beautifully studded with ornamental tubercles, arranged in symmetrical groups like gems and pearls on a jewel. This character is most strongly dominant in the tuberculated bones of the fossil genus Coccosteus. The enormous proportion in the size of the head to that of the body in the Gurnard, affords another approximation to a condition of frequent occurrence in the extinct genera of the old red sandstone, and which has given its characteristic feature to the genus Cephalaspis.

Another frequent character in the fossil fishes of the old red sandstone consists in the absence of any internal bony skeleton, as in the modern Sturgeons. The large bony dermal scales, first noticed many years ago in the old red sandstone of Fife by Dr. Fleming, and then referred by him to a fossil Sturgeon, have been confirmed by Prof. Agassiz as belonging to a genus nearly allied to the modern Sturgeon, and like it possessed a cartilaginous skeleton, of which no traces remain in the fossil state.

Among living fishes, a further analogy to this cartilaginous condition of the internal skeleton has recently been found by Professor Owen in the Siren, a fish of equivocal aspect, provided with lungs as well as branchiæ, and considered as a reptile by preceding writers; it lives in the muddy bottoms of the shallow lakes of Senegal, which are periodically dried up, the fish meantime remaining immured alive in a kind of cocoon of indurated mud*. In the cartilaginous skeleton of this existing Siren from Senegal, the anatomy of which has been admirably demonstrated by Professor Owen, we find a beautiful analogy to the cartilaginous condition of the skeleton of many of the most ancient fossil fishes; and this analogy explains the circumstance of the frequent absence of any remains of an internal bony skeleton within the often perfect dermal covering of many species of fishes in strata of the older formations.

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* See Annals, vol. vi. p. 466; vii. p. 28.

From these recent discoveries in Scotland, and the examination of the unexampled collections of fossil fishes in the museums of Lord Enniskillen and Sir P. Egerton, and in other cabinets in this country and on the Continent, Prof. Agassiz has now extended his total number of species of extinct fossil fishes to more than 1700, of which nearly 250 new species have been the fruits of his recent visit to Great Britain and Ireland. I have elsewhere spoken of the inestimable value of the discoveries of Agassiz in the department of fossil ichthyology, not only in relation to geological investigations, but also to zoology and physiology. In his history of the rapid progress he has made within the last six years, it has been duly and gratefully acknowledged by him, that his now voluminous work, the 'Poissons Fossiles,' must at an early stage have ceased for lack of funds, without the liberal support it has received from a large list of subscribers in this country, and from pecuniary grants of the British Association. [See vol. vii. p. 487.]

In the necessary preparations for this large and costly work, M. Agassiz had accumulated in his portfolio a splendid collection of drawings, chiefly by Dinkel, not less beautiful as works of art, than precious as being the originals of the plates in his great scientific monument, the 'Poissons Fossiles;' but, engaged as he is in a multitude of other costly and splendid scientific works, the Professor of Neufchatel was anxious to employ the capital thus locked up in his portfolio in a way more profitable to science, by causing it to fructify in the production of other publications. By a recent accident this fact came to the knowledge of Lord Francis Egerton, who forthwith proposed to become the purchaser of this entire collection of original drawings, about 1200 in number, permitting M. Agassiz to retain at Neufchatel the unpublished portion of them as long as may be convenient for the completion of his work. Such opportune and liberal interference to advance the progress of a work of pre-eminent scientific value is becoming of a nobleman long distinguished as a patron of Art, and whose conviction thus substantially shown of the value of researches which are rendering such inestimable service to Science, evinces his Lordship's worthiness of his position as President of the Geological Society at Manchester*.

FOSSIL CRUSTACEANS.—GIGANTIC SPECIES OF EURYPTERUS.

It will be in the recollection of those among us who have watched the progress of the recent rapid discoveries of fossil fishes in the old red sandstone, that at the Edinburgh Meeting of the British Association (1834) a most anomalous fossil from the old red sandstone of Clashbinnie, in the county of Forfar, and considered by the discoverer to be a fish resembling the Angel Fish, was rejected by Agassiz from that class of animals; whilst neither he nor any other naturalist could even conjecture to what class in the animal kingdom it should be referred, and in this enigmatic state it was left by Agassiz in the notice given of it in his 'Poissons Fossiles.' At the late Meeting at Glasgow, this enigma found its solution by our recognising in the College Museum some of the most perplexing characters of the Clashbinnie fossil in two large specimens of Eurypterus in sandstone from the coal-field of that neighbourhood. We had before seen, at the Edinburgh Meeting, a remarkable fossil Crustacean, nearly of the size and form of a large Molucca crab, found by Dr. Simson in the carboniferous limestone of Kirkton near Bathgate, between Edinburgh and Glasgow; and Dr. Harlan had described and figured a smaller species of Eurypterus from the carboniferous limestone of the United States (see Fourth Report of British Association, 1834, p. 643). We have, therefore, now extended our knowledge of the range of this very remarkable family of Crustaceans from the sandstone and limestone of the coal formation downwards into the old red sandstone.

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* M. Agassiz has acknowledged in some of the leading scientific journals of the Continent the liberality with which Lord Francis Egerton has thus come forward to facilitate the progress of researches, in which the scientific world is deeply interested.

M. Fischer de Waldheim has lately discovered a new species of Eurypterus, *E. tetragonophthalmus*, in the transition formation of Podolia, nearly allied to the small species in the grauwacke of Westmoreland in New York, on which this genus was founded by Dr. Dekay. (Annals of the Lycæum of Nat. Hist., vol. i. p. 375, pl. 29.)

FOSSIL ARACHNIDANS.

In the family of Arachnidans we have an account by M. Corda, in the Report of the National Museum of Bohemia, 1839, of a second new genus of fossil Scorpioid, *Microlabis Sternbergii*, discovered by the late Count Sternberg in 1838, in the same quarry with the new genus Cyclophthalmus, found by him a few years before in a similar sandstone of the coal formation at Chomle, near Radnitz, in Bohemia*. M. Corda places this new fossil in the class of Pseudo-scorpions, near the Chelifer and Obisium of Leach: it is larger than the living *Obisium carcinoides*. In this, as in the *Cyclophthalmus Sternbergii*, the skin is preserved in several parts of the body in the state of a brown, semi-transparent, horn-like substance, over which pores of the tracheæ and indications of hairs are dispersed at regular intervals. The enduring nature of the peculiar substance (chitine or elytrine), of which, like the elytra of beetles, the skin of scorpions is composed, explains the cause of its perfect preservation in such ancient sandstone. M. Corda justly considers these two fossil scorpioids of Bohemia (the only two of which any account has been yet published) to be among the most remarkable discoveries of modern times.

The Marquis of Northampton has recently acquired four new species of fossil spiders, one of them imbedded in the lithographic stone of Solenhofen, the other three from the freshwater formation of Aix. The Solenhofen fossil has ten legs, and is considered by Mr J. E. Gray to be nearly allied to the genus Nymphon, the living species of which are found parasitic on marine animals; and in the same stone with it is a fossil Ophiura, to which, when living, it may have been attached. Each of the three from Aix has eight legs; they are all probably freshwater spiders of the genus Argyroneta, and two of them are of the same species. In the same freshwater limestone with one of them is an impression resembling a Chelifer or Book Scorpion, having the claws of a scorpion but not its tail.

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* Figures of this unique fossil are given in pl. 46'. of my Bridgewater Treatise.

FOSSIL INSECTS.

We noticed last year Mr. Brodie's discovery of the wing of a Libellula and other insects in the Wealden freshwater formation near Dinton, in the vale of Wardour, in Wiltshire. Mr. H. E. Strickland has more recently found a very perfect fossil wing of another Dragonfly in the lias of Warwickshire, near Evesham, on which the opake spot usually found at the anterior margin of the wing in Libellulidæ is distinctly marked. The nervures on this wing closely resemble those on recent species, and approach most nearly to the genus Æshna. The occurrence of Libellulidæ has not hitherto been noticed in any formation older than the lithographic stone of Solenhofen, in the upper region of the oolite series; and the discovery of a species so nearly allied to the existing genus Æshna in the lias formation, where it is associated with reptiles differing so widely from existing forms as the Ichthyosaurus and Plesiosaurus, leads to curious speculations respecting the fauna of this early period.

The discovery of land insects in strata that are, for the most part, crowded with marine remains, is explained by supposing multitudes of insects to have been occasionally drifted by tempests into the sea. In the Proceedings of Geol. Society, vol. ii. p. 688, is a notice by myself of a hitherto unique example of a large neuropterous wing in the Stonesfield slate, a marine formation at the top of the inferior oolite, more nearly allied to the Hemerobius than to any other modern insect. With this Hemerobioid are found at Stonesfield abundant elytra of coleopterous insects, and the bones of insectivorous marsupial quadrupeds and Pterodactyles. In the Museum of the University of Glasgow I saw, in September last, remains of some small hymenopterous insects attached to fragments of coal from the neighbourhood of that city, but of these no careful examination had then been made.

A large wing of a neuropterous insect, resembling the living Corydalis of Carolina, in a nodule of clay iron ore, probably from the coal-field of Staffordshire, has been figured by Mr. Murchison in his 'Silurian System' (Wood-cut 13, letter *a*, p. 105,) from a specimen in the Museum of Mr. Mantell.

FOSSIL RADIATA.

The history of fossil radiated animals has, during the last year, received a valuable accession from the publication, by Professor Agassiz, of the second part of his description of the fossil Echinodermata of Switzerland*.

The family of Cidarides forms the exclusive subject of this memoir, being the most numerous of all the families of Echinites, and at the same time the earliest form under which shells of this kind appear to have existed; they are the only family that occurs so early as the muschelkalk, whilst no other family of Echini is found in formations older than the Jurassic, in which the Cidarides are most numerous; they abound also in the cretaceous and tertiary formations, and in our actual seas*. In the Jura mountains they are most numerous in a stratum, called *Terrain à Chailles*, abounding, with other littoral shells, near the middle region of the oolite formation.

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* Mémoires Nouveaux de la Société Helvétique des Sciences Naturelles, vol. iv.

Professor Agassiz has also published the first monograph of another splendid work, 'Monographies d'Échinodermes, vivans et fossiles,'† which will be extended to ten or twelve parts, to be completed in three or four years, and will contain about 150 plates, some of them coloured, from careful drawings of this most beautiful class of shells. Collections of casts of all the fossil species of this class known to M. Agassiz may be obtained by purchase, or in exchange for objects of natural history, at the Museum of Neufchatel.

In the family of Star-fish two new fossil genera have been recently established by Mr. Gray‡, one of these, Comptonia, founded on a specimen from the whetstone pits in the greensand of Blackdown, Devon, recently acquired by the Marquis of Northampton; it is preserved in the state of beautiful chalcedony, and explains the intermediate character of the genus Cœlaster of Agassiz. The other new genus Fromia, comprehends the curious tesselated star-fishes found in the chalk, and also a recent species found in various parts of New Holland.

Professor Agassiz will shortly send an artist to England, to figure for his great work on living and fossil Echinoderms, the individual specimens which Mr. Gray has described in his Monograph on Star-fish. It is a new and important feature in the progress of zoology and palæontology, that this much-neglected department of radiated animals is at length receiving that attention which, from the time of Henry Linck, who dedicated a large volume on this subject to Sir Hans Sloane (1733), to the moment when it has recently been resumed by Nardo, Agassiz, and Gray, it has so long merited in vain. [To these must now be added the elegant and highly interesting History of Star-fishes and Echinodermata by Mr. Edward Forbes,—a work full of entertainment for the general reader, as well as of accurate and original information for the scientific naturalist.—Ed.]

SPONGES IN CHALK FLINTS.

Mr. Bowerbank, in a paper on siliceous bodies in the chalk, greensand, and Portland oolite, has applied the evidence of microscopic observation to confirm the opinion long entertained by many naturalists, that the tuberous forms of chalk flints and chert are due to organic bodies acting as nuclei, or centres of attraction, to the silex of which these tubercles are composed. Mr. Parkinson, in his interesting work on 'Organic Remains of a Former World' (1808, vol. ii. p. 87 *et seq.*), had noticed acicular spicula, which he found to be common to fossil sponges and fossil Alcyonia; and in pl. 7. fig. 8. of the same volume he represents the magnified appearance of cruciform spines in a fossil Alcyonite resembling the *Alcyonium cynodium* of Linnæus, and quotes Donati as having described and delineated them before him. It has also long been known that a large proportion of the chalk flints in Wilts, Oxon, and Bucks, contain, within a gray external siliceous crust of variable thickness, a nucleus of semi-transparent flint, often of a purple tint, and exhibiting distinctly a congeries of tubes and net-work, nearly allied to modern Alcyonia; these Alcyonia were supposed to have acted as nuclei, or centres of attraction, which became first surrounded by the crust of gray flint, bearing no traces of organization, and subsequently penetrated by a kind of red or purple chalcedony, taking the place of the particles of animal matter as they gradually decayed. This hypothesis has been modified by Mr. Bowerbank, who has superadded the agency of parasitic sponges, which he supposes to have attached themselves to the alcyonic nuclei, and also to Echini and other shells, forming round these organic nuclei a covering or crust of sponge, which assumed, in its mode of growth, those irregularly tuberculated forms that are so common in, and are almost peculiar to, chalk flints.

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* Cidarides have recently been found in the carboniferous limestone of the Mendip Hills, near Frome, by Miss Bennet, and by myself in the carboniferous limestone near Donegal, in 1811.

† We have received from Mr. Charlesworth a translation from the second number of this work of "Observations on the progress made in the History of the Echinodermata," which will appear in our next.—Ed.

‡ See Monograph on Star-fish, Ann. Nat. Hist., No. 36, Nov. 1840, vol. vi. p. 175, 278, 286.

Having submitted to his microscope thin slices of chalk flints, in search of Foraminifera and Xanthidia, he observed, together with them, patches of brown reticulated tissue and spongiform spicula pervading the entire mass of the flints under examination; this spongiform structure was further pervaded by many tortuous cylindrical and minute canals of uniform diameter, which appeared to be the incurrent canals of the sponge, and by other orifices of greater diameter, resembling excurrent canals. He thinks that the mode in which the spicula, foraminifers, and other extraneous bodies are equably dispersed throughout the silex, shows that these bodies were entangled in the spongiform tissue in which their fossilization has taken place.

With respect to the Echini and other shells, which are more or less filled with, or surrounded by gray flint, he supposes the parasitic sponges to have grown both around and within the cavity of these shells, and in the case of Echini to have sometimes protruded outwards, sending forth branches through their orifices from the parasitic sponge within. He cites the parasitic habit of some modern sponges, which are found investing shells and other substances, in support of this hypothesis.

In chalk flints from Wiltshire he found the spongiform structure and spicula pervading the gray crust that enclosed many zoophytic nuclei; but within these nuclei were neither spicula nor any of the minute extraneous bodies which are frequent in the tubular spongiform crust. The character of these fossil sponges differs from tha of any recent sponge.

In chert from the greensand of Fovant, Wilts, and from Lyme Regis, Mr. Bowerbank found a similar but coarser texture; and also in chert casts of Spatangi from the greensand near Shaftesbury. In chert from Portland and Tisbury he found similar cellular tissue, but larger, and in texture more like the modern freshwater sponge.

Mr. Bowerbank supposes the organic matter of the sponges and zoophytes to have afforded to the silex stronger centres of attraction than were offered by the siliceous spicula of the sponges; and there is a geological consideration which seems to favour the hypothesis, of the siliceous matter of chalk flints whilst in a semifluid state having been segregated from the compound mass of lime and silex of the nascent chalk beds, by the attraction of some organic body, in the facts that the upper region of the English soft chalk, which most abounds in flints, is nearly pure carbonate of lime; whilst the lower region of the hard chalk is usually destitute of flints, and has silex diffused throughout its entire substance*. I cannot, however, but think there is something too exclusive in Mr. Bowerbank's theory as to the universal presence of parasitic sponges in the external crust of every chalk-flint, and which admits of no case in which an Alcyonium or any kind of extraneous body in chalk may, without the co-operation of a sponge, have become externally invested with a crust of silex of the same kind with that which he allows to have been attracted to corallines and alcyonic bodies by the animal matter they contained.

MICROSCOPIC SHELLS.

Mr. Tennant has informed me that a microscopic examination of the Stonesfield slate by Mr. Darker, and of other oolites, has recently shown them to be crowded with remains of organized bodies, invisible to the naked eye. I learn also from Mr. Tennant that abundant microscopic organic remains have recently been discovered in thin slices of certain beds of carboniferous limestone from Derbyshire; similar results may shortly be expected from a microscopic examination of the chert of the same formation. We must not however be tempted by these discoveries to rush suddenly to the rash and unwarranted conclusion, that all limestone and all silex is of organic origin.

It has not yet been shown that the granules resembling the roe of fishes, which give character to the oolite formation, and abound occasionally in limestones of the triassic, carboniferous, and silurian series, have any necessary connexion with organic bodies. We may with Ehrenberg admit and admire the extent of microscopic chambered shells and Infusoria, which he has shown so largely to pervade the chalk and other calcareous and siliceous formations, without claiming an exclusively animal origin for the entire substance of all rocks in which lime or silex are the principal ingredients.

[* "We observed no vestige of flints in the limestone at Seedrapett, and all the fossils there consist of carbonate of lime, and effervesce freely with acid; but the vast quantity of silicified wood in the neighbouring formation of red sand, seems to point to some phænomenon similar to what must have existed during the deposition of the cretaceous beds of Europe."—*Mr. Kaye on the Fossiliferous Beds of Pondicherry, Calcutta Journ. Nat. Hist.*, No. 6.]

When we recollect what great discoveries have been already made in the investigations of fossil botany by means of the microscope, and look to the inestimable value of the information obtained by Professor Owen, as to the structure of the teeth of fossil fishes, reptiles, and mammals, and see the wonderful results of the application of this new power to the examination of chalk and flint by Professor Ehrenberg*, Mr. Lonsdale and Mr. Bowerbank, we may justly congratulate ourselves on the commencement of a new epoch in microscopic palæontology.—*Address delivered at the Anniversary Meeting of the Geological Society*, 1841.

EXPEDITION TO TORRES STRAITS AND NEW GUINEA.

The Fly, one of the vessels destined for the survey of Torres Straits, will sail from Plymouth in a few days, and, we are happy to learn, with an active botanical collector on board, and Mr. Jukes for zoology.

METEOROLOGICAL OBSERVATIONS FOR FEB. 1842.

Chiswick.—February 1. Overcast: very fine: clear. 2. Very fine: slight rain in the evening. 3. Slight haze. 4. Calm with slight haze. 5. Hazy. 6. Dry haze: fine. 7. Sleet. 8. Foggy. 9. Overcast: fine. 10. Slight haze. 11, 12. Cloudy. 13. Clear and fine. 14—16. Very fine. 17. Foggy. 18. Clear and fine. 19. Frosty and foggy. 20. Drizzly. 21. Overcast: clear. 22. Drizzly: cloudy. 23. Thickly overcast: cloudy: rain. 24. Cloudy. 25. Cold rain: showery. 26. Showery: clear and cold. 27. Stormy showers: heavy rain: densely overcast. 28. Fine: overcast: stormy at night.

Boston.—Feb. 1. Fine: rain early A.M. 2, 3. Fine. 4. Foggy. 5, 6. Cloudy. 7. Cloudy: snow A.M.: rain P.M. 8. Cloudy: rain P.M. 9. Foggy. 10. Cloudy. 11. Fine: rain P.M. 12. Cloudy. 13—16. Fine. 17, 18. Cloudy. 19. Foggy. 20. Fine. 21. Cloudy: rain A.M. and P.M. 22. Fine. 23. Cloudy: rain P.M. 24. Rain. 25. Rain: rain early A.M.: snow A.M. 26. Cloudy: snow early A.M. 27. Cloudy: rain A.M. 28. Stormy.

Sandwick Manse, Orkney.—Feb. 1. Cloudy: showers. 2. Showers: aurora. 3. Cloudy: clear. 4, 5. Fine. 6. Damp: frost. 7. Frost: aurora. 8. Frost: cloudy. 9, 10. Clear: rain. 11. Clear: showery. 12. Showery. 13. Clear: cloudy. 14. Cloudy: aurora. 15. Showers: aurora. 16. Cloudy. 17. Fine. 18. Cloudy: showers. 19. Cloudy: rain. 20. Showers. 21. Clear. 22. Clear: cloudy. 23. Cloudy. 24. Clear: cloudy. 25. Clear. 26, 27. Frost: sleet-showers. 28. Showers.

Applegarth Manse, Dumfries-shire.—Feb. 1, 2. Fine: thaw. 3. Frost A.M.: fog P.M. 4. Thaw and slight rain A.M. 5. Frost: fine. 6. Dull and cloudy, but freezing. 7. Frost: still dull. 8. Frost: clear. 9. Thaw and heavy rain P.M. 10. Wet morning: blew strong. 11, 12. Very wet and stormy. 13. Wet. 14. Slight showers. 15. Slight showers: cleared P.M. 16. Frost A.M.: fair all day. 17. Dull and moist. 18, 19. Fine and fair. 20. Fine and fair, but high wind. 21—23. Rain A.M.: cleared. 24. Frost A.M.: fine. 25. Wet A.M.: cleared P.M. 26. Rain P.M. 27. Snow, hail, rain and wind. 28. Rain.

Sun shone out 24 days. Rain fell 15 days. Frost 7 days. Snow and hail 1 day. Fog 1 day.

Wind north-north-east 1 day. East-north-east 1 day. East 3 days. East-south-east 3 days. South 4 days. South-south-west 7 days. South-west 4 days. West-south-west 1 day. West 5 days.

Calm 5 days. Moderate 12 days. Brisk 2 days. Strong breeze 4 days. Boisterous 2 days. Stormy 3 days.

Mean temperature of the month	37°·7
Mean temperature of February 1841	36 ·50
Mean temperature of spring-water	44 ·30
Mean temperature of spring-water, February 1841 ...	42 ·60

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* See vol. vii. p. 398, and Scientific Memoirs, part x.

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr. Roberton; *by* Mr. Thompson, *at the Garden of the Horticultural Society at* CHISWICK, *near London*; *by* Mr. Veall, *at* BOSTON; *by* Mr. Dunbar, *at Applegarth Manse*, DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse*, ORKNEY.

Days of Month.	Barometer.								Thermometer.										Wind.					Rain.					Dew-point.
	London: Roy. Soc. 9 a.m.	Chiswick.		Boston. 8¾ a.m.	Dumfries-shire.		Orkney, Sandwick.		London: R.S.			Chiswick.		Boston. 8¾ a.m.	Dumf.-shire.		Orkney, Sandwick.		London: R.S. 9 a.m.	Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	London: R.S. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Lond. R. S. 9 a.m.
1842. Feb.		Max.	Min.		9 a.m.	9 p.m.	9½ a.m.	8½ p.m.	Fahr. 9 a.m.	Self-reg. Mx.	Self-reg. Mm.	Max.	Min.		Max.	Min.	9½ a.m.	8½ p.m.											
1.	30·140	30·130	30·100	29·74	29·92	29·87	29·80	29·54	39·5	47·0	37·8	46	26	35	42	32½	39	43½	w.	nw.	calm	w.	s.	·166	......	·22	......	·04	42
☾ 2.	30·198	30·241	30·059	29·79	29·85	30·09	29·72	29·94	41·7	45·7	38·0	50	40	37	46	39	40	42	sw.	w.	calm	w.	w.	......	·02	......	......	·13	38
3.	30·436	30·409	30·377	30·03	30·21	30·24	30·06	30·20	43·8	49·2	41·7	45	37	35	43½	31½	45	43½	nw.	nw.	calm	ssw.	sw.	......	......	......	......	·05	41
4.	30·480	30·439	30·351	30·12	30·21	30·20	30·15	30·18	39·8	46·3	40·3	42	30	36	44½	30½	41	41	ne.	e.	calm	ssw.	s.	......	......	......	......	......	40
5.	30·286	30·267	30·177	29·99	30·17	30·05	30·15	30·16	35·7	40·0	33·3	42	27	30	42	30	42	40	ene.	e.	calm	w.	sw.	......	......	......	......	......	35
6.	30·118	30·109	29·892	29·83	30·00	29·85	30·07	29·97	32·8	35·7	32·0	38	26	33	32½	27½	37	33½	e.	e.	calm	e.	se.	......	·06	......	0·00	......	29
7.	29·724	29·786	29·697	29·52	29·70	29·68	29·84	29·81	35·2	37·6	33·0	40	30	35	37	26	35	34	ene.	e.	calm	e.	se.	·033	·11	......	......	......	33
8.	29·828	29·816	29·786	29·55	29·69	29·69	29·87	29·86	34·8	40·6	33·0	46	28	35	41	30½	36½	37	ne.	e.	calm	ene.	se.	·094	·06	·20	......	......	33
9.	29·812	29·795	29·512	29·50	29·55	29·41	29·71	29·51	40·8	45·0	35·2	51	43	40	43	32	39	41	s.	s.	calm	ese.	se.	·063	......	·06	......	......	38
● 10.	29·946	29·986	29·895	29·53	29·57	29·55	29·52	29·35	45·7	49·0	41·2	51	41	45	46	39	41	42	s.	s.	calm	ssw.	se.	......	......	......	......	·17	41
11.	30·026	29·985	29·970	29·49	29·42	29·54	29·20	29·25	47·3	50·3	45·8	52	47	47	47	42	46	40	s.	s.	sw.	ssw.	s.	......	·14	......	......	·32	46
12.	30·072	30·065	30·004	29·50	29·49	29·53	29·35	29·20	50·2	52·2	47·4	54	30	50	48	39½	41	40	s.	s.	sw.	s.	s.	·094	......	·11	......	·15	46
13.	30·220	30·180	30·020	29·74	29·79	29·76	29·62	29·58	44·2	53·0	42·5	52	28	47·5	43½	37½	41	38½	sse.	s.	calm	ese.	sw.	·009	·04	......	1·48	·08	43
14.	30·456	30·452	30·390	29·94	30·10	30·11	29·94	29·94	40·3	50·7	38·5	52	37	38	46	34	42½	45	w.	s.	w.	sw.	s.	·061	......	......	......	·07	41
15.	30·500	30·446	30·424	29·98	30·00	30·24	29·81	29·05	46·8	49·7	40·3	54	40	41	47½	41	44	43	s.	sw.	s.	w.	sw.	......	......	......	......	·06	44
16.	30·546	30·488	30·416	30·05	30·30	30·24	30·12	30·06	46·3	51·6	44·8	53	33	39	46	32	44	45	w.	sw.	calm	sw.	sw.	......	......	......	......	......	43
17.	30·410	30·372	30·252	29·90	30·12	30·08	30·03	30·05	44·3	49·2	43·7	49	25	43	45	34	42½	39	s.	s.	calm	sw.	sw.	......	......	......	......	......	43
☽ 18.	30·374	30·367	30·316	29·94	30·12	30·20	29·93	30·12	36·8	48·2	36·0	47	24	36·5	47½	40	44½	41	s.	nw.	calm	sw.	w.	......	......	......	......	......	38
19.	30·402	30·377	30·194	29·98	30·12	29·90	29·89	29·68	34·7	43·7	33·3	49	30	33·5	48	40	42	44½	sw.	w.	calm	s.	sw.	......	·02	......	......	......	39
20.	30·054	30·030	29·881	29·68	29·75	29·59	29·52	29·53	35·3	45·0	35·0	40	31	37	48	40½	43	41	s.	sw.	calm	s.	sw.	......	......	......	0·21	·44	37
21.	29·782	29·813	29·771	29·40	29·45	29·60	29·49	29·52	39·7	40·0	35·0	48	27	36	44	43	40	39	se.	sw.	se.	ssw.	w.	......	·16	......	......	·18	36
22.	29·756	29·753	29·616	29·47	29·50	29·31	29·44	29·27	41·8	47·8	38·8	50	34	33	45	30½	40	40½	e.	s.	calm	s.	s.	·161	......	·13	......	......	39
23.	29·444	29·444	29·167	29·14	29·17	28·95	29·24	29·05	44·8	48·8	42·0	50	40	39	43	37	40	41	sse.	s.	calm	e.	se.	......	·11	......	......	......	42
24.	29·152	29·171	29·115	28·77	28·98	28·98	29·08	29·10	41·9	49·5	41·8	47	33	41·5	43	29½	37	36	s.	s.	calm	nne.	calm	·059	·11	·16	......	·15	41
○ 25.	29·216	29·250	29·180	28·80	29·07	29·08	29·12	29·09	39·3	48·0	36·3	45	23	39	44	35½	39	37	w.	w.	calm	w.	s.	·130	·07	·20	......	......	41
26.	29·400	29·570	29·367	29·00	29·00	29·24	28·93	29·15	39·2	45·3	35·0	48	30	34	42	31½	34	38	se.	w.	calm	wsw.	w.	·052	·04	·31	......	......	36
27.	29·550	29·470	29·377	29·17	28·95	28·87	29·00	28·52	40·5	46·0	35·2	44	36	35	42	29½	36	38½	s.	s.	se.	ssw.	se.	·133	·05	......	1·00	·10	36
28.	29·622	29·593	29·388	29·12	28·90	28·97	28·65	28·90	41·7	43·6	39·0	51	42	40	46	36	42	41½	s.	s.	w.	ssw.	w.	·291	·33	·09	......	·26	38
Mean.	29·998	29·953	29·882	29·59	29·681	29·671	29·610	29·590	40·9	46·4	38·4	47·71	32·78	38·2	39·3	34·9	40·50	40·21						Sum 1·346	1·32	1·48	2·69	2·20	Mean. 39